FLUKE®

ScopeMeter® 190C/190B Series

Technical Data

ScopeMeter 190C and 190B Series: Speed, performance and analysis power

For demanding applications, the ScopeMeter 190C and 190B Series high-performance oscilloscopes offer specifications usually found on top-end bench instruments. With up to 200 MHz bandwidth, 2.5 GS/s real time sampling and a deep memory of 27,500 points per input they're ideal for engineers who need the full capabilities of a high-performance scope in a hand-held, battery powered instrument.

- Dual input – 200, 100 or 60 MHz bandwidth
- Up to 2.5 GS/s real time sampling per input
- Connect-and-View™ automatic triggering, a full range of manual trigger modes plus external triggering
- Digital Persistence for analyzing complex, dynamic signals like on an analog oscilloscope (190C)
- Fast display update rate for seeing dynamic behavior instantaneously
- Automatic capture and replay of 100 screens
- 27,500 points and more per input record length using ScopeRecord™ mode
- TrendPlot™ paperless recorder for trend analysis up to 22 days
- 1,000 V CAT II and 600 V CAT III safety certified
- Waveform reference for visual comparison and automatic pass/fail testing (190C) of waveforms
- Up to 1,000 V independently floating isolated inputs
- Four hours rechargeable NiMH battery pack

ScopeMeter 120 Series: Three-in-one simplicity

The compact ScopeMeter 120 Series is the rugged solution for industrial troubleshooting and installation applications. It's a truly integrated test tool, with oscilloscope, multimeter and "paperless" recorder in one affordable, easy-to-use instrument. Find fast answers to problems in machinery, instrumentation, control and power systems.

- A dual input 40 MHz or 20 MHz digital oscilloscope
- Two 5,000 counts true-rms digital multimeters
- Cursor measurements (Fluke 124)
- A dual input TrendPlot recorder
- Connect-and-View trigger simplicity for hands-off operation
- Shielded test leads for oscilloscope, resistance, continuity and capacitance measurements
- Full bandwidth, VPS40 10:1 40 MHz probe included standard with Fluke 124
- Up to seven hours battery operation
- 600 V CAT III safety certified
- Optically isolated RS-232 interface
- Rugged, compact case

Technical Specifications 190C and 190B Series

Oscilloscope Mode

Vertical Deflection

	Fluke 199C Fluke 199B	Fluke 196C Fluke 196B	Fluke 192B
Bandwidth	200 MHz	100 MHz	60 MHz
Rise time	1.7 ns	3.5 ns	5.8 ns

Bandwidth limiter: User selectable: 10 kHz, 20 MHz or off
Number of inputs: 2 plus external trigger. All inputs isolated from each other and ground.
Input coupling: AC or DC, with ground level indicator
Input sensitivity: 2 mV/div to 100 V/div (Fluke 190C Series); 5 mV/div to 100 V/div (Fluke 190B Series)
Variable attenuator: Variable gain on input channel A
Input voltage: 1000 V CAT II, 600 V CAT III rated – See "general specifications" for further details.
Vertical resolution: 8 bit
Accuracy: ± (1.5% of reading + 0.04 x range/div)
Input impedance: 1 MΩ ± 1% // 15 pF ± 2 pF

Horizontal

	Fluke 199C Fluke 199B	Fluke 196C Fluke 196B	Fluke 192B
Maximum real-time sample rate	2.5 GS/s	1 GS/s	500 MS/s
Number of digitizers	2	2	2
Time base range	5 ns/div to 5 s/div		10 ns/div to 5 s/div

Maximum record length: 1,200 points per input in Scope mode; 27,500 points per input in ScopeRecord™ roll mode (5 ms/div to 2 min/div)
Accuracy: ± (0.01 % of reading + 1 pixel)
Glitch capture: 50 nsec (at 5 µsec/div to 1 min/div); 250 nsec (at 2 min/div)

Display and Acquisition

	Fluke 199C Fluke 196C	Fluke 199B Fluke 196B Fluke 192B
Display	144 mm (5.67") full color LCD	144 mm (5.67") monochrome LCD
Display modes	Input A, input B, dual, average, invert, replay, Digital Persistence mode (short/medium/ long/infinite)	Input A, input B, dual, average, invert, replay, persistence (on/off)

Visible screen width: 12 divisions in scope mode
Waveform mathematics: A + B, A – B, A * B, all with user selectable scaling of resultant; A versus B (X – Y-mode)
Acquisition modes: Normal, auto, single shot, ScopeRecord™ roll, glitch capture, waveform compare, waveform compare with automatic "Pass / Fail testing" (in 199C and 196C only)

Trigger and Delay

Source: Input A, input B, external trigger input. All input references isolated from each other and from ground
Modes: Automatic Connect-and-View,™ free run, single shot, edge, delay, video, video line, selectable pulsewidth
Connect-and-View™: Advanced automatic triggering that recognizes signal patterns, automatically sets up and continuously adjusts triggering, time base and amplitude. Automatically displays stable waveforms of complex and dynamic signals like motor drive and control signals.
Video triggering: NTSC, PAL, PAL+, SECAM. Includes field 1, field 2 and line select.
Pulse width triggering: Pulse width qualified by time. Allows for triggering <t, >t, =t, ≠t, where t is selectable in minimal steps of 0.01 div. or 50 nsec.
Time delay: One full screen of pre-trigger view or up to 100 screens (1200 divisions) of post-trigger delay

Automatic Capture of 100 Screens

The instrument ALWAYS memorizes last 100 screens (no user interaction or setup required). When an anomaly occurs on screen, the HOLD button can be pressed to review the full screen sequence over and over.

Instrument can be set up for triggering on glitches or intermittent anomalies and will operate in "baby-sit" mode and will capture 100 events.

Alternatively, the 199C and 196C can be set up in waveform compare mode to store only matching ("Pass") or only non-matching ("Fail") acquired waveforms in the replay memory bank for further analysis.
Replay: Manual or continuous replay. Displays the captured 100 screens as a "live" animation. Each screen is labelled with date and timestamp. The contents can also be viewed by manually scrolling backwards and forwards "screen by screen."
Replay storage: Up to 2 sets of 100 screens each can be saved for later recall and analysis

Waveform Compare and Pass/Fail Testing

Waveform compare: Provides storage and display of a reference waveform for visual comparison with newly acquired waveforms. Reference is derived from an acquired waveform and can be modified in the ScopeMeter or externally using FlukeView® Software.
Pass/Fail Testing (199C, 196C): In waveform compare mode, the Color Scopemeter can be set up to store only matching ("Pass") or only non-matching ("Fail") acquired waveforms in the replay memory bank for further analysis.

Automatic Scope Measurements

Vdc, Vac rms, Vac+dc, Vpeak max, Vpeak min, Vpeak to peak, Aac, Adc, Aac+dc, frequency (Hz), risetime, falltime, power factor, Watts, VA, VA reactive, phase, pulse width (pos/neg), dutycycle (pos/neg), temperature °C, temperature °F, dBV, dBm into 50 Ω and 600 Ω

Vpwm ac, Vpwm ac+dc for measurement on pulse width modulated motordrives and frequency inverters

Cursor Measurements

Source: Input A, input B or the Mathematical Result trace
Dual horizontal lines: Voltage at cursor 1 and 2, voltage between cursors
Dual vertical lines: Time between cursors, 1/T between cursors (in Hz), voltage between markers, risetime with markers, falltime with markers
Single vertical line: Min-Max and Average voltage at cursor position
Zoom: Up to 8x horizontal zoom

Meter Mode

Via 4 mm banana inputs. Fully isolated from scope inputs and scope ground. The specified accuracy is valid over the temperature range 18 °C to 28 °C (65 °F to 82 °F). Add 10 % of specified accuracy for each degree C below 18 °C or above 28 °C.
Maximum Resolution: 5,000 counts
Voltmeter Ranges: 500 mV, 5 V, 50 V, 500 V, 1,000 V
Accuracy:
Vdc ± (0.5 % + 5 counts)
Vac true rms
15 Hz...60 Hz: ± (1 % + 10 counts)
60 Hz...1 kHz: ± (2.5 % + 15 counts)
Vac+dc true rms
dc...60 Hz: ± (1 % + 10 counts)
60 Hz...1 kHz: ± (2.5 % + 15 counts)
Ohms:
Ranges: 500 Ω, 5 kΩ, 50 kΩ, 500 kΩ, 5 MΩ, 30 MΩ
Accuracy: ± (0.6 % + 5 counts)

Other Meter Functions

Continuity: Beeper on < 50 Ω (± 30 Ω)
Diode test: Up to 2.8 V
Amps: Adc, Aac, Aac+dc using an optional current clamp or shunt
Scaling factors: 0.1 mV/A ... 100 V/A
Temperature (°C, °F): With optional accessories. Scale factors 1 mV/°C or 1 mV/°F
Input impedance: 1 MΩ ± 1% // 10 pF ± 2 pF
Advanced meter functions: Auto/manual ranging, relative measurements (Zero reference), TrendPlot recording

Recorder Mode

ScopeRecord-Roll Mode

Dual input waveform storage mode
Source and display: Input A, Input B, Dual
Memory depth: 27,500 points per input or more. Each point consists of Min-Max pair
Min-Max values: Min-Max values are measured at high sample rates ensuring capture and display of glitches

Time base range	5 ms/div to 1 min/div	2 min/div
Recorded timespan	6 sec to 24 hr	48 hr
Glitch capture	50 ns	250 ns
Sample rate	20 MS/s	4 MS/s
Resolution	200 µsec to 2 sec	4.8 sec

Recording modes: Single sweep, continuous roll, Start-on-Trigger, Stop-on-Trigger
Stop-on-Trigger (through external): ScopeRecord mode can be stopped by an individual trigger event, or by an interruption of a repetitive trigger signal
Horizontal scale: Time from start, time of day
Zoom: Up to 100x
Memory: Up to 2 dual input ScopeRecord waveforms can be saved for later recall and analysis

TrendPlot™ recording

Single or dual input electronic paperless chart recorder. Plots, displays and stores meter and scope measurements.
Source and display: Input A, Input B or DMM input
Memory depth: 18,000 points recording. Per record point a minimum, a maximum and an average value, plus a date and timestamp are recorded.
Ranges: 5 s/div to 30 min/div in normal view mode; 5 min/div to 48 hr/div in view all mode, giving overview of total record
Recorded timespan: Up to 22 days with a resolution of 1 minute
Recording mode: Continuous roll for the duration of the full recordable timespan
Measurement speed: 5 measurements per second
Horizontal scale: Time from start, time of day
Zoom: Up to 64x zoom
Memory: Up to 2 TrendPlot recordings can be saved for later recall and analysis

Cursor measurements – all recorder modes

Source: Input A, B or DMM input
Dual vertical lines: Min-Max or Average voltage. Time between cursors
Single vertical line: Min-Max or Average voltage. Absolute date and time or time from start

General Specifications

Case

Design: Rugged, shock proof with integrated protective holster
Drip and dust proof: IP51 according to IEC529
Shock and Vibration: Shock 30 g, Vibration (sinusoidal and random) 3 g according to MIL-PRF-28800F Class 2

	Fluke 199C, 196C	Fluke 199B, 196B, 192B
Display	Bright full-color LCD with CCFL backlight, 80 (30) Cd/m^2 with (without) power adapter	Bright monochrome LCD with CCFL backlight, 125 (75) Cd/m^2 with (without) power adapter

Display size: 115.2 x 86.4 mm (4.54 x 3.4 in.)
Resolution: 320 x 240 pixels
Contrast and brightness: User adjustable, temperature compensated

Memory Save and Recall

Scope memories: 10 memory locations that each can contain two waveforms plus corresponding setup
Recorder memories: 2 memory locations that each can contain 100 captured dual input scope screens, or a dual input ScopeRecord (27,500 Min-Max pairs per input), or a dual input Trendplot (18,000 min-max pairs + average values)

Real-Time Clock

Time and date stamp for ScopeRecord, 100 captured screens and TrendPlots

Power

Line power: Country specific line voltage adapter/battery charger included
Battery power: Rechargeable NiMH (installed)
Battery operating time: 4 hours
Battery charging time: 4 hours
Battery power saving functions: Auto power down with adjustable power down time. On screen battery power indicator

Mechanical Data

Size: 256 x 169 x 64 mm (10.1 x 6.6 x 2.5 in)
Weight: 2 kg (4.4 lbs)

Safety

Compliance:
EN61010-1 (1993) Pollution degree 2
UL 3111-1 (1994)
CAN/CSA C22.2 No.1010.1 (1992)
ANSI/ISA S82.01 (1994)

Input Voltage Ratings

Maximum probe voltage: 1,000 V CAT II/600 V CAT III
(Maximum voltage between 10:1 probe tip (VPS200) and reference lead)
Floating voltage: 1,000 V CAT II/600 V CAT III
(Maximum voltage between earth ground and any terminal (signal input or shielding))
Independently isolated inputs:
1,000 V CAT II/600 V CAT III
(Maximum voltage between any terminal of one input or probe (VPS200) and any other terminal of another input or probe (VPS200))
Maximum voltage on BNC input directly (input A or B): 300 V CAT III
Maximum voltage on meter input:
1,000 V CAT II/600 V CAT III

Environmental

Operating temperature: 0 °C to +50 °C
Storage temperature: -20 °C to +60 °C
Humidity:
10 °C to 30 °C: 95% RH non condensing
30 °C to 40 °C: 75% RH non condensing
40 °C to 50 °C: 45% RH non condensing
Maximum operating altitude: 3,000 m (10,000 feet)
Maximum storage altitude: 12 km (40,000 feet)
Electro-Magnetic-Compatibility (EMC): EN 61326-1 for emission and immunity

Optically Isolated PC / Printer Interface

PC communication: Transfer instrument settings, screen images, waveform data and waveform references, compatible with FlukeView® software for Windows® via optional PM9080.
To printer: Supports HP Laserjet®, DeskJet, Epson FX/LQ and Postscript printers via optional PAC 91

Warranty

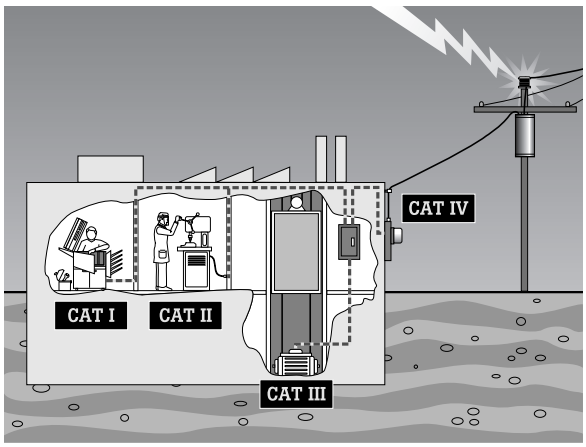
3 years, parts and labor on mainframe instrument
1 year on accessories

Accessories

Standard Accessories	Fluke 199C, Fluke 196C, Fluke 199B, Fluke 196B, Fluke 192B
Rechargeable battery pack (installed)	BP190
Line voltage adapter / Battery charger	BC190
Voltage probes and accessories	10:1 voltage probe (VPS200, 1 red + 1 grey) including hook clip, ground lead with mini alligator clip, ground lead with hook clip, 4 mm add-on probe tip, ground lead to 4 mm banana plug
Multimeter test leads	TL75 Hard Point test lead set (1red, 1 black)
User manual	9 language versions on CD-ROM, "Getting Started" booklet included with instrument

International Safety Standards

Overvoltage Category	Summary description
CAT IV	Three phase at utility connection, any outdoors conductors (under 1,000 V) • Outside and service entrance • Service drop from pole to building • Run between meter and panel • Overhead line to detached building • Underground line to well pump
CAT III	Three-phase distribution (under 1,000 V), including single phase commercial lighting and distribution panels • Feeders and short branch circuits • Distribution panel devices • Heavy appliance outlets with "short" connections to service entrance
CAT II	Single-phase receptable connected loads • Outlets and long branch circuits • All outlets at more than 10 m (30 ft) from Category III source • All outlets at more than 20 m (60 ft) from Category IV source
CAT I	Electronic • Electronic equipment • Low energy equipment with transient limiting protection



To protect your instrument and – more importantly – yourself, choose a test tool that can withstand the electrical hazards present in the environment in which you plan to use it.

EN61010 establishes international safety requirements for electrical measurement equipment. It separates the various electrical environments into installation categories based on the danger from high voltage-energy transients. To choose the right tool, the voltage rating alone does not determine the safety. It is the combination of voltage rating and installation category that determines maximum transient withstand capability of the tool. CAT III rated instruments are recommended for measurement on industrial power distribution systems.

FlukeView® ScopeMeter® Software for Windows®

FlukeView software adds PC power to your Fluke ScopeMeter Test Tools.

FlukeView ScopeMeter software helps you get more out of your ScopeMeter:

- Store instrument's screen copies on the PC, in color (with Fluke 190C Series) or in black and white (Fluke 190B and 120 Series)
- Copy color screen images into your reports and documentation (color screen images with Fluke 190C Series only)
- Capture and store waveform data from your ScopeMeter on your PC
- Create and archive waveform references for automatic (Fluke 190C Series) or visual (Fluke 190B and 190C Series) comparison
- Use cursors for parameter measurement
- Includes waveform analysis, e.g., FFT spectrum analysis
- Copy waveform data into your spreadsheet for detailed analysis
- Extended recording of up to four user-selected measurements help you monitor and analyze slow moving signals and related events
- Logging of other readings directly into other application programs, eg., spreadsheet
- Add user text to instrument setups and send these to the instrument for operator reference and instructions
- Capture complete Replay sequence into the PC for further analysis and documentation
- English, French and German versions included on a single CD-ROM

Note: Some functionality may be available with specific ScopeMeter models only

System requirements

- Pentium 90 or better
- CD-ROM drive
- Windows® 95 / 98 / Me / NT 4.0 / 2000 / XP
- One free RS 232 port
- PM9080 Optically isolated RS 232 adapter/cable, available separately or included in SCC190/SCC120 kit and in ScopeMeter 'S' versions

Supported Instruments

Full support for Fluke 199C, 199B, 199, 196C, 196B, 196, 192B, 192, 124, 123

FLUKE®

Selection Guide

	190C Color ScopeMeter Series		190B ScopeMeter Series			Fluke 120 Series	
	Fluke 199C	Fluke 196C	Fluke 199B	Fluke 196B	Fluke 192B	Fluke 124	Fluke 123
Bandwidth	200 MHz	100 MHz	200 MHz	100 MHz	60 MHz	40 MHz	20 MHz
Max real time sample rate	2.5 GS/s	1 GS/s	2.5 GS/s	1 GS/s	500 MS/s	25 MS/s	
Max equivalent time sample rate	–					2.5 GS/s	1.25 GS/s
Display	144 mm full color LCD		144 mm monochrome LCD			102 mm monochrome LCD	
Digital persistence	Yes, gives analog oscilloscope like waveform decay (user selectable)		–			–	
Envelope mode	Yes		Yes			Yes	
Waveform compare	Visual reference and automatic 'Pass / Fail' testing		Visual reference			–	
Max record length in Scope Mode: in ScopeRecord mode:	1200 points per input channel 27,500 points per input or more (5 ms/div to 2 min/div)					512 min/max points per input –	
Number of inputs	2 plus external / DMM input, all isolated from each other and from ground					2	
Number of digitizers	2					2	
Independently floating isolated inputs	Up to 1000 V between inputs, references and ground					–	
Input sensitivity	2 mV/div to 100 V/div		5 mV/div. to 100 V/div			5 mV/div to 500 V/div	
Glitch capture	Up to 3 ns using pulse width triggering; 50 ns peak detect at 5 ms/div to 1 min/div					40 ns	
Timebase range in Scope mode	5 ns/div to 2 min/div				10 ns/div to 2 min/div	10 ns/div to 1 min/div	20 ns/div to 1 min/div
Trigger types	Connect-and-View™, Free Run, Single Shot, Edge, Delay, Video Frame, Video Line, Selectable Pulse Width and External					Connect-and-View™, Free Run, Single Shot, Edge, Video	
Scope measurements	7 cursor measurements, 30 automatic measurements					cursors + 26 automatic measurements	26 automatic measurements
Waveform mathematics	A + B, A – B, A x B, A versus B (X-Y-mode, giving Lissajous diagrams)					–	
ScopeRecord trigger modes	Start on trigger, stop on trigger					–	
Capture last 100 screens	Automatic, with replay capability					–	
Dual input TrendPlot	Yes, with cursors and zoom					Yes	
Memory for screens and set-ups	10 screens with set-up; 5 more memories are made available upon registration of the ScopeMeter					20	10
Memory for recordings	Two, each can store 100 scope screens, a ScopeRecord or a TrendPlot						
True-rms multimeter	5000 counts, Volts, Amps, Ohms, Continuity, Diode, Temp						
Safety certified (EN61010-1)	1000 V CAT II / 600 V CAT III (instrument and included accessories)					600 V CAT III (instrument and included accessories)	
Battery (installed)	4 hr Ni-MH BP190					7 hr NiMH	5 hr NiCd
Line Power	Adapter / battery-charger included						
Size	25 x 16.9 x 6.4 cm (10.1 x 6.7 x 2.5 in)					232 x 115 x 50 mm (9.2 x 4.5 x 2 in)	
Weight	2 kg (4.4 lb)					1.2 kg (2.64 lbs)	
PC and Printer Interface	Using optional optically isolated RS-232 adapter/cable						
Warranty	3 years on main instrument, 1 year on the standard accessories						

Detailed technical specifications and optional accessories can be found on the Fluke web site. There, you can also download a fully-functional instrument which is based on the real instrument firmware. Check it out at: **www.fluke.com/scopemeter**.

Ordering Information

Fluke-199C/S	Color ScopeMeter (200 MHz / 2.5 GS/s) with SCC190 kit
Fluke-199C	Color ScopeMeter (200 MHz / 2.5 GS/s)
Fluke-196C/S	Color ScopeMeter (100 MHz / 1 GS/s) with SCC190 kit
Fluke-196C	Color ScopeMeter (100 MHz / 1 GS/s)
Fluke-199B/S	ScopeMeter (200 MHz / 2.5 GS/s) with SCC190 kit
Fluke-199B	ScopeMeter (200 MHz / 2.5 GS/s)
Fluke-196B/S	ScopeMeter (100 MHz / 1 GS/s) with SCC190 kit
Fluke-196B	ScopeMeter (100 MHz / 1 GS/s)
Fluke-192B/S	ScopeMeter (60 MHz / 500 MS/s) with SCC190 kit
Fluke-192B	ScopeMeter (60 MHz / 500 MS/s)
Fluke-124/S	Industrial ScopeMeter, 40 MHz, with SCC120 kit
Fluke-124	Industrial ScopeMeter, 40 MHz
Fluke-123/S	Industrial ScopeMeter, 20 MHz, with SCC120 kit
Fluke-123	Industrial ScopeMeter, 20 MHz
BP120	Rechargeable NiCd Battery for use with Fluke 120 Series
BP130	Rechargeable NiMH Battery for use with Fluke 120 Series
BP190	Rechargeable NiMH Battery for use with Fluke 190 Series ScopeMeters
SW90W	FlukeView ScopeMeter Software for Windows
PM9080	Optically isolated RS232 adapter/cable
SCC190	Software – Cable – Case kit for Fluke 190 Series
SCC120	Software – Cable – Case kit for Fluke 120 Series
C195	Durable, universal soft carrying case for ScopeMeters and accessories
C190	Hard shell protective carrying case for Fluke 190 Series ScopeMeters
C125	Durable, protective soft carrying case for Fluke 120 Series ScopeMeters
C120	Hard shell protective carrying case for Fluke 120 Series ScopeMeters
DP120	Differential Voltage Probe for use with Fluke 120 Series
VPS40	40 MHz, 10:1 Voltage probe set for use with Fluke 120 Series

Fluke. *Keeping your world up and running.*

Fluke Corporation
PO Box 9090, Everett, WA USA 98206

Fluke Europe B.V.
PO Box 1186, 5602 BD
Eindhoven, The Netherlands

For more information call:
In the U.S.A. (800) 443-5853 or
Fax (425) 446-5116
In Europe/M-East/Africa +31 (0) 40 2675 200 or
Fax +31 (0) 40 2675 222
In Canada (800)-36-FLUKE or
Fax (905) 890-6866
From other countries (425) 446-5500 or
Fax (425) 446-5116
Web access: http://www.fluke.com/

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Printed in U.S.A. 11/2002 1629083 D-ENG-N Rev C